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Rural Water Supplies in South Dakota : Stanley County

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Rural Water Supplies in South Dakota

STANLEY County

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RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

STANLEY COUNTY

BY

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AND

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PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY.

JANUARY 1940

FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections, each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent, in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of flowing wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

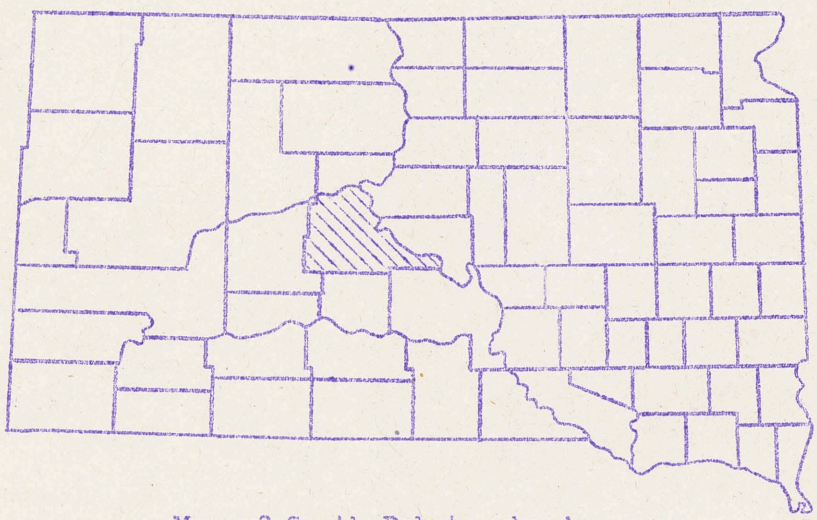
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaire. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

Stanley County

Stanley county is in the west central part of South Dakota, approximately in the center of the state. It is bounded on the north by the Cheyenne river, on the east by the Missouri river, on the south by Jones and Lyman counties, and on the west by Haakon county.



Map of South Dakota showing
location of Stanley county

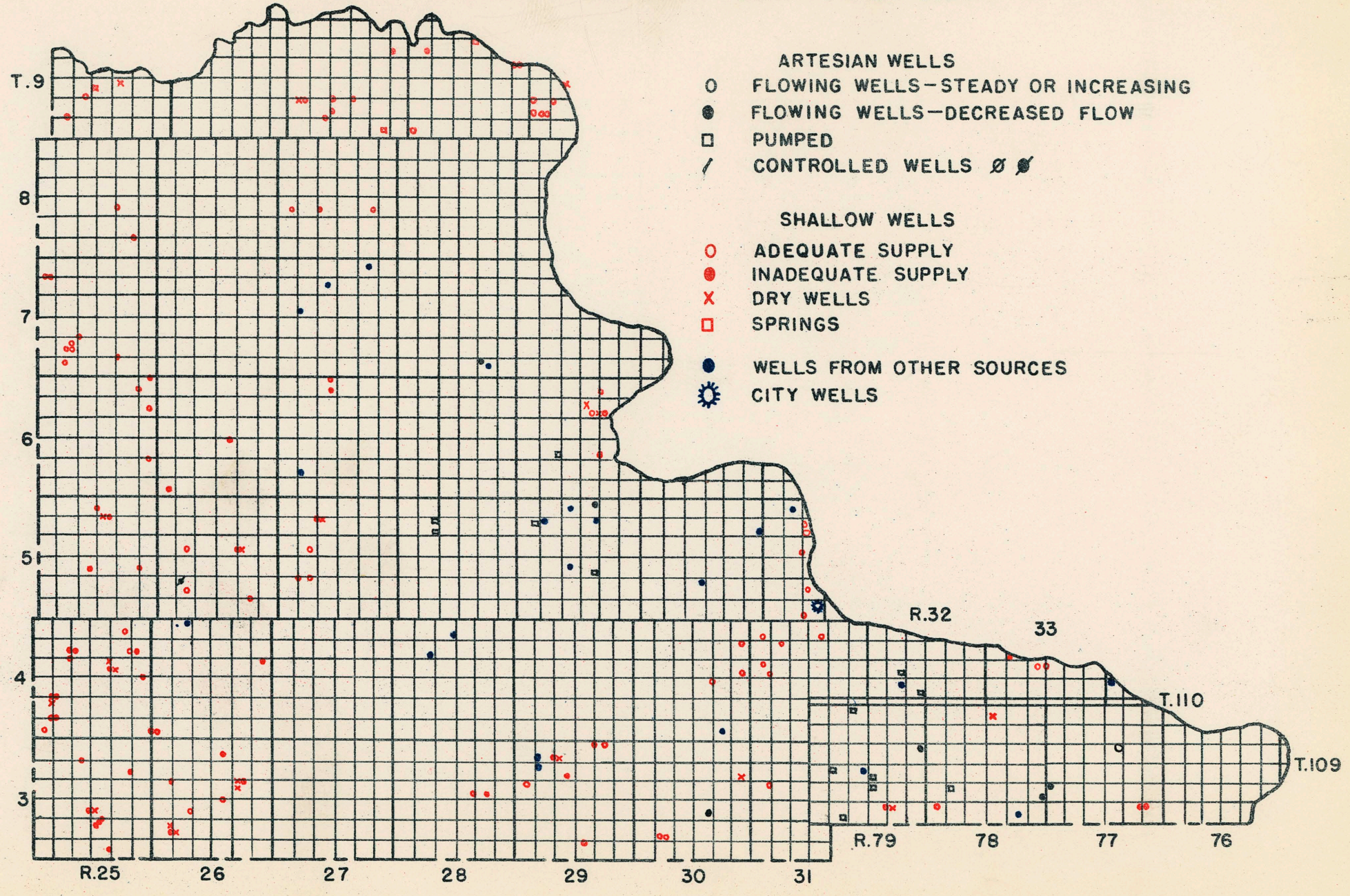
Stanley county is mainly an agricultural county, having approximately 306,821 (31.5 per cent) of a total 973,440 acres in farms. There are 416 farm units, each of approximately 737 acres. Approximately half (45.1 per cent) of the acreage in farms is under cultivation. Wheat, hay, barley, corn, oats, and rye are the important field crops, being produced in the order named. Livestock is also important, with cattle, horses and mules, sheep, and hogs valued highest.*

In order that farm units of this type may be operated successfully, it is necessary that suitable and adequate supplies of underground water be available and that it be obtained at low cost. Supplies required are not great, but they should be constant and generally distributed. The well location map of Stanley county indicates that, in general, such supplies are available and widely distributed.

On the well location map of Stanley county, all deep pumped and deep flow-

*South Dakota Agricultural Statistics, Annual Report, 1937

LOCATION OF ARTESIAN AND SHALLOW WELLS IN STANLEY COUNTY



ing wells obtaining water from artesian sources, mostly the Dakota-Lakota sandstones, are shown in black as artesian wells. All other wells are shown in red and are called shallow wells regardless of depth. On all other maps and in the tables and text of this report, the term shallow wells applies to those wells of 200 feet or less in depth, and those greater than 200 feet deep are treated as deep wells, including all artesian wells, unless otherwise stated.

Questionnaires were sent to 296 farmers and land owners of Stanley county, of whom 164 responded with information on 138 wells, 50 cisterns, and three springs. This represented a coverage of 55.4 per cent for Stanley county.

DEPTH AND DISTRIBUTION

Rural water supplies of Stanley county were obtained from shallow pumped, deep pumped and deep flowing wells, which were rather widely distributed over the county.

Shallow wells: Approximately 85 per cent of all wells reported in Stanley county were shallow pumped wells. Of the 117 shallow wells reported, all were less than 50 feet in depth with the exception of one well in T.109N., R.79W., which was exactly 50 feet deep. Thus, all of the shallow wells reported for Stanley county were 50 feet or less in depth.

The following townships reported all wells shallow:

Twp.	Rge.	Total Wells	Twp.	Rge.	Total Wells	Twp.	Rge.	Total Wells
3N	25E	7	4N	30E	3	6N	27E	2
3	26	6	4	31	5	7	25	8
3	28	2	4	33	3	8	25	2
3	29	6	5	25	4	8	27	3
3	31	1	5	27	4	9	25	2
4	25	13	5	31	5	9	27	6
4	26	5	6	25	4	9	28	4
4	27	2	6	26	2	9	29	5

No shallow flowing wells were reported in the county and none are known to occur.

Deep wells: Approximately 15 per cent of the rural water supplies of

STANLEY COUNTY

SHALLOW WELLS (0-200 FT)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

0-50 FT.

50-100 FT.

100-150 FT.

150-200 FT.

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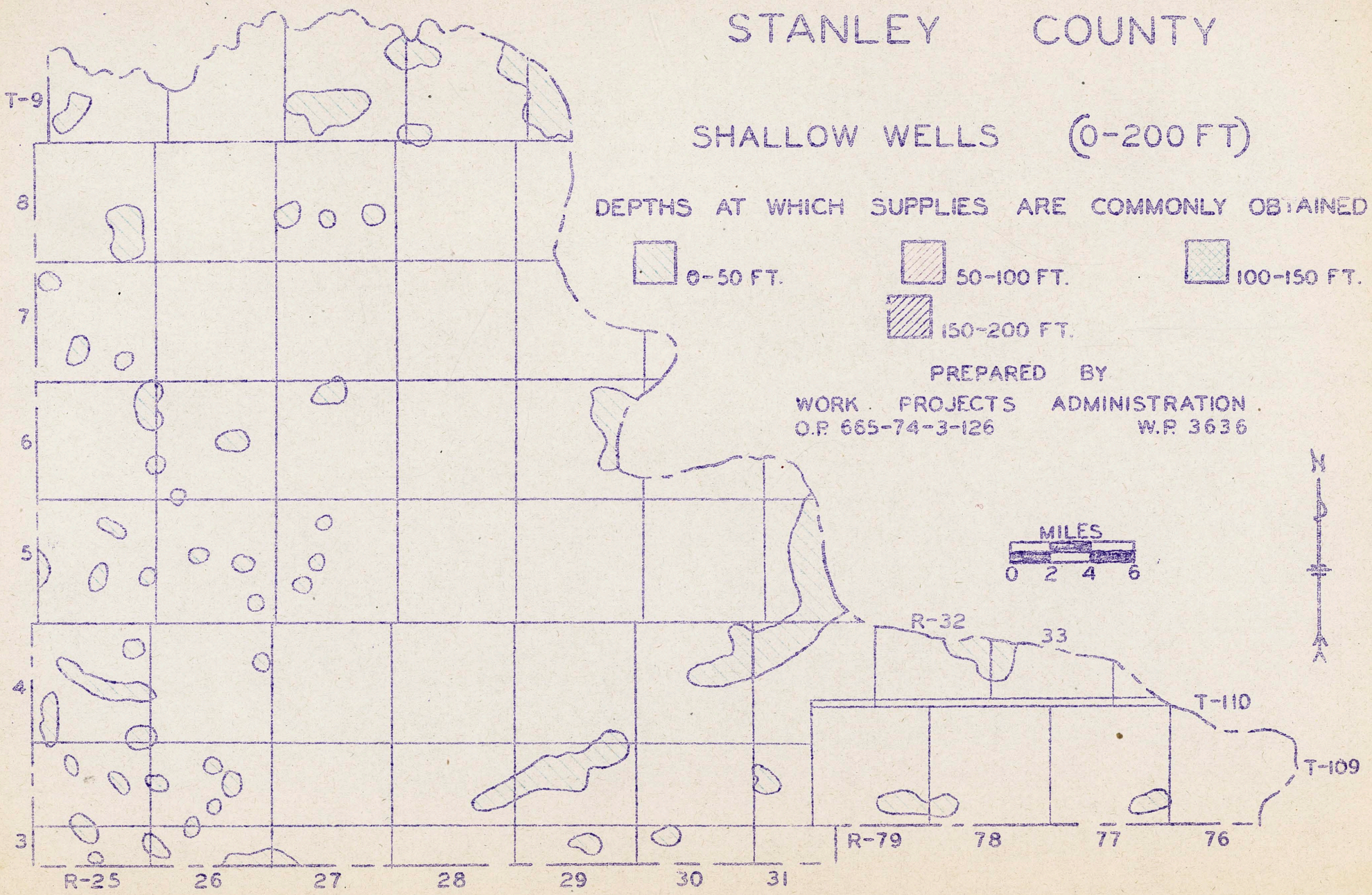


Stanley county were obtained from deep wells (pumped and flowing). Of these deep wells, thirteen (62 per cent) were pumped and eight (38 per cent) were flowing. The deep wells in Stanley county range in depth from 1200 feet to 1978 feet. Water was, however, not obtained at all depths between the minimum and maximum. The following table shows the location, number, and minimum and maximum depths of the deep wells in Stanley county:

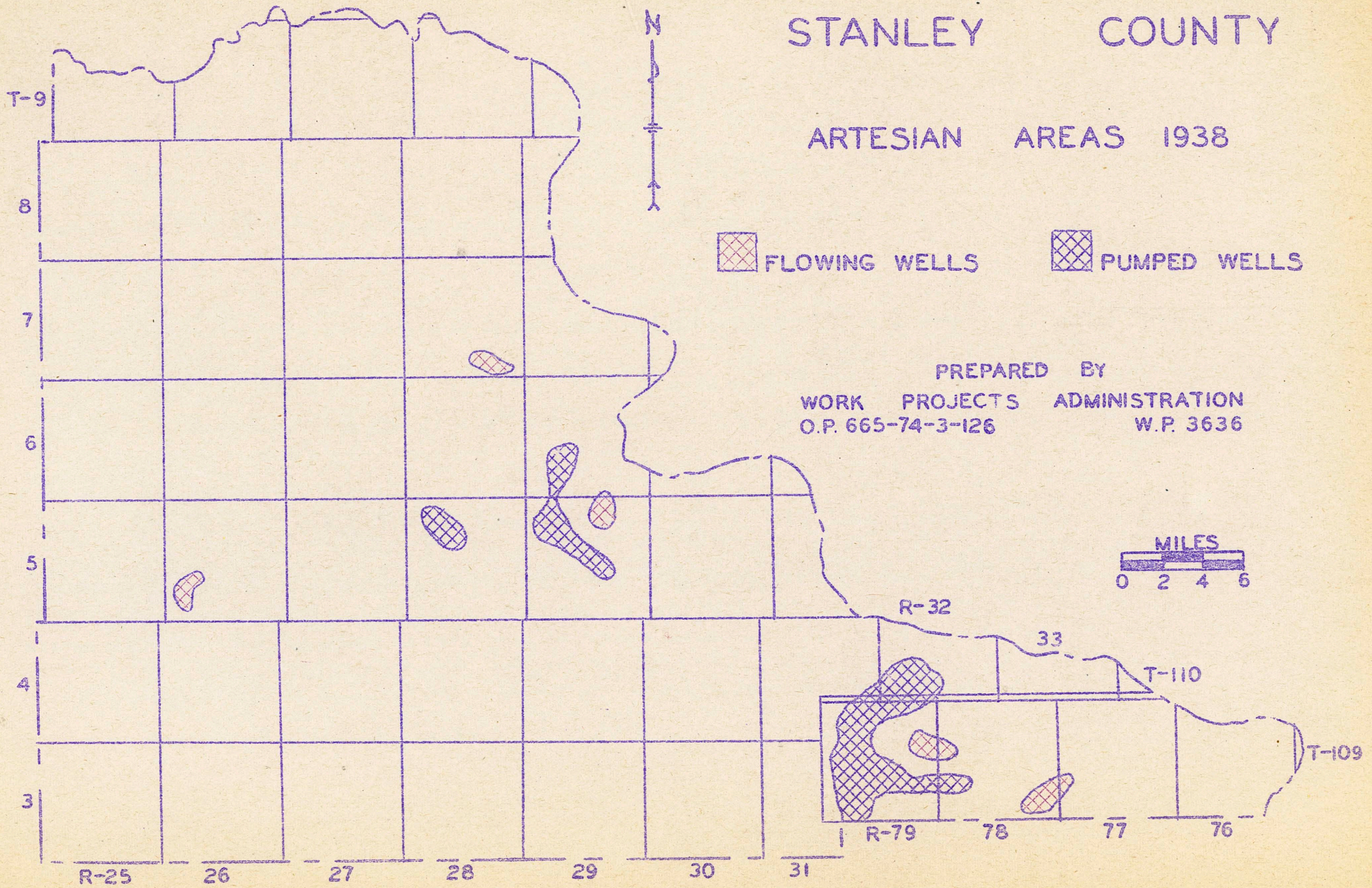
Location		Number of	Depths	
Twp.	Rge.	Wells	Minimum	Maximum
109N	77W	2	1400	1575
109	78	2	1500	1600
109	79	6	1560	1700
3	30E	1	1575	
4	32	2	1600	
5	26	1		
5	28	2	1900	1978
5	29	3	1200	1400
6	29	1	1700	
7	28	1	1700	
		21		

The artesian well map of Stanley county on page 9 shows the areas of artesian wells in the county, and the artesian map on page 10 shows the relation of Stanley county to the artesian areas of the state.

CHARACTER OF WELL WATERS

In order to determine character of water in the county, users were asked to indicate whether they considered supplies to be hard, moderately hard, or soft. Chemical analyses are not generally available to farmers. Usage of the water, however, is a fairly satisfactory criterion until laboratory analyses are available.

In general, shallow supplies in Stanley county produce hard water, and the deeper wells were reported with soft water. Of all the shallow wells reported in the county, 58.9 per cent produced hard water; 25.2 per cent moderately hard; and 15.9 per cent, soft. Thus, approximately 84 per cent of all shallow wells in Stanley county produced definitely hard or moderately hard water. Hard water wells are widely distributed over the county. There were few shallow soft water wells, and most of these are on the lowlands in townships along the Missouri river.


STANLEY COUNTY
ARTESIAN AREAS 1938
FLOWING WELLS
PUMPED WELLS
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O.P. 665-74-3-126
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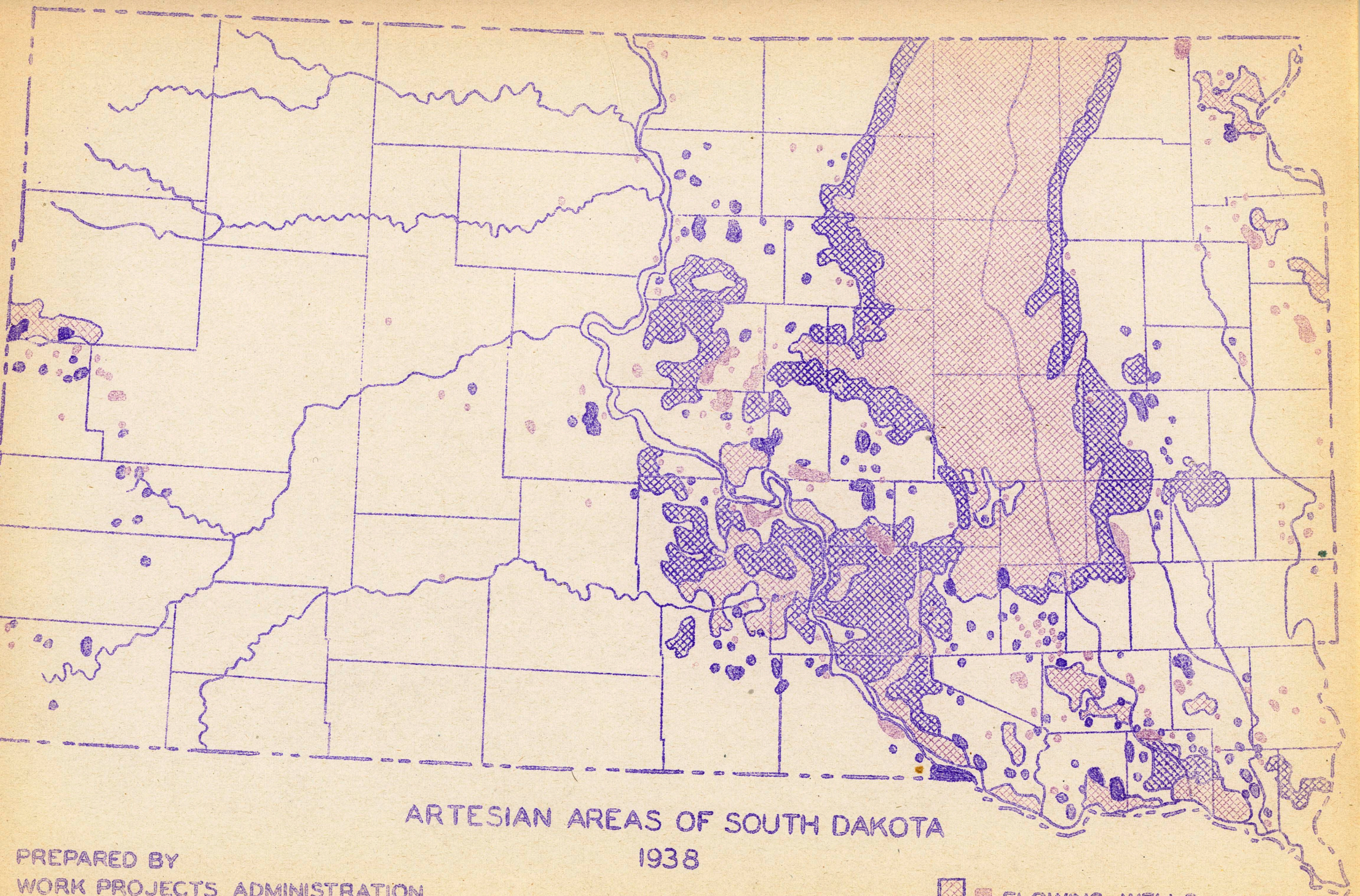

ARTESIAN AREAS OF SOUTH DAKOTA

1938

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O.P. 665-74-3-126
W.P. 3636

FLOWING WELLS

PUMPED ARTESIAN WELLS

Deep wells, pumped and flowing, much more commonly produce soft water than the shallow, for only two wells (10.5 per cent) were reported with hard water, seven wells (36.9 per cent) moderately hard, and ten wells (52.6 per cent) soft water. The most common occurrence of soft water in deep wells was reported from 1575 to 1740 feet, but those wells deeper than 1740 feet were reported to produce hard water. The soft water wells were distributed generally throughout the county at the depths stated.

A rather high percentage of unsuitable water was reported from both shallow and deep wells of Stanley county. Water from 33 (28.2 per cent) of the shallow wells was reported unsuitable for drinking with most of the unsatisfactory waters reported from the western half of the county. In contrast, the townships along the Missouri river in the northern part of the county reported all wells to supply water suitable for drinking.

Water from 13 (62 per cent) of the deep wells was reported unsuitable for drinking purposes and these were reported from the following townships:

Twp.	Rge.	Total Number of Wells	Unsuitable Wells	Per cent Unsuitable	Average Depth
109N	78W	1	1	100.	1487
109	79	6	4	66.7	1617
4N	32E	2	2	100.	1600
5	28	2	2	100.	1939
5	29	3	2	80.	1200
6	29	1	1	100.	1700
7	28	1	1	100.	1700
		16	13		

Waters are unsuitable for several possible reasons, among which are surface contamination and objectionable or unpalatable ingredients. In some cases injurious ingredients may also be present, which can be detected only from chemical analyses.

ADEQUACY OF WELL WATERS

Well supplies in Stanley county are, in general, adequate for present needs but water supplies are, and may continue to be one of the most important

agricultural problems of this area.

A relatively large number, 47 (34.1 per cent) of the 138 wells reported in Stanley county were reported inadequate for current needs. Of these, 44 were shallow wells; one was a deep flowing well; and two were deep pumped wells. Most of the inadequate shallow wells were reported in the western half of the county, except in the townships which border the Missouri river in the northern part of the county which reported no inadequacy. A large number of inadequate wells was also reported from T.109N., R.77W., T.109N., R.79W., and T.4N., R.33E.

Two inadequate deep pumped wells were reported from T.5N., R.28E., and T.6N., R.29E., at depths of 1900 and 1700 feet respectively. An inadequate flowing well was reported from T.3N., R.30E., at a depth of 1575 feet.

The average approximate flow of the well in T.7N., R.28E., was reported at 35 gallons per minute. One of the flowing wells in T.5N., R.26E., was reported with a control valve. The rate of flow of one well was reported as increasing; three wells reported a decrease in flow; and one reported a steady flow.

IRRIGATION

Seven shallow wells were used to irrigate a total of 4 7/8 acres in garden plots ranging in size from 1/8 to four acres. None of the deep wells were used for irrigation. One spring irrigated a garden plot of 1/8 acre in size.

SUPPLEMENTARY WATER SUPPLIES

Springs were not an important source of supplementary supplies in Stanley county, since only three were reported. All of the springs were in the northern tier of townships. All were reported adequate for present needs, and none were unsuitable for drinking purposes. Character of the water from two of the springs was reported. One produced moderately hard water and one soft water.

Cisterns are an important source of supplementary supplies in Stanley county, since 50 (approximately one cistern to every three wells) were reported. These cisterns were used for laundry purposes in hard water areas and for drinking and cooking in areas where regular supplies were inadequate or unsuitable. Farmers with shallow wells reported 41 cisterns, of which 39 were used for drinking and cooking and 34 for laundry purposes. Users of artesian wells reported nine cisterns, of which six were used for cooking and drinking, and three for laundry purposes. No cisterns were reported by farmers with springs.

STANLEY COUNTY

Table 1.

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
109	77	2	30	40	35	-	-	2	-	-	-	2	-	-
109	78	1	30	30	30	1	-	-	-	-	1	-	-	-
109	79	1	50	50	50	1	-	-	1	1	-	1	-	-
3	25	7	12	25	18	5	1	1	-	4	-	6	-	-
3	26	6	10	30	18	2	3	-	-	1	2	4	-	-
3	28	2	15	32	23	1	-	1	-	1	1	1	-	-
3	29	6	11	40	29	5	1	-	1	2	3	3	-	-
3	30	2	6	9	7	2	-	-	-	-	2	-	-	-
3	31	1	40	40	40	1	-	-	1	1	1	-	-	-
4	25	13	12	28	16	7	4	-	1	3	5	8	1	1/4
4	26	5	12	22	16	4	-	-	1	3	3	2	-	-
4	27	2	-	-	-	1	-	-	-	2	-	2	-	-
4	30	3	22	28	24	2	-	1	-	1	3	-	-	-
4	31	5	22	30	27	4	1	-	1	-	5	-	-	-
4	33	3	20	30	24	2	-	-	-	2	2	1	-	-
5	25	4	14	25	20	1	2	1	-	1	1	3	-	-
5	26	4	12	22	18	4	-	-	-	2	3	1	-	-
5	27	4	20	37	26	3	-	-	-	2	2	2	-	-
5	31	5	19	32	25	-	2	3	-	-	5	-	-	-
6	25	4	20	34	27	4	-	-	3	2	3	1	-	-
6	26	2	18	33	25	2	-	-	2	2	1	1	-	-
6	27	2	9	10	9	2	-	-	-	1	1	1	-	-
6	29	3	20	30	24	1	2	-	1	-	3	-	1	4
7	25	8	12	28	19	4	2	1	-	1	7	1	-	-
8	25	2	12	15	13	2	-	-	1	1	2	-	-	-
8	27	3	22	28	24	-	2	1	-	-	2	1	1	1/8
9	25	2	6	14	10	1	-	1	-	-	2	-	1	-
9	27	6	10	31	20	-	3	3	-	-	4	2	1	1/4
9	28	4	10	32	22	-	3	1	-	-	3	1	2	1/4
9	29	5	10	38	21	1	1	1	1	-	5	-	-	-
Total		117				63	27	17	14	33	73	44	7	4 7/8

STANLEY COUNTY

Table 2.

DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
109	78	1	1600	1600	1600	-	-	1	-	1	1	-	-	-
109	79	5	1560	1740	1617	1	2	2	2	3	5	-	-	-
4	32	2	1600	1600	1600	-	-	2	2	2	2	-	-	-
5	28	2	1900	1978	1939	-	1	1	1	2	1	1	-	-
5	29	2	1400	1400	1400	-	2	-	1	1	2	-	-	-
6	29	1	1700	1700	1700	-	1	-	1	1	-	1	-	-
Total		13				1	6	6	7	10	11	2	-	-

NOTE: No Wells over 200 feet in depth reported for the following:

Township (N)	Range (E)
109	77
3	25 to 31, Incl.
4	25 to 30, Incl. & 33
5	25 & 26
6	25 to 27, Incl.
7	25
8	27
9	25 to 29, Incl.

STANLEY COUNTY
Table 3.
DATA ON FLOWING WELLS

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY					
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inadequate	Number used for Irrigation	Approx. Acres Irrigated	Ave. Gallon Per Min.	Number Controlled
109	77	2	1400	1575	1487	-	-	1	1	-	2	-	-	-	-	-
109	78	1	1500	1500	1500	1	-	-	1	-	1	-	-	-	-	-
109	79	1	1700	1700	1700	-	-	1	-	1	1	-	-	-	-	-
3	30	1	1575	1575	1575	-	-	-	-	-	-	1	-	-	-	-
5	29	1	1200	1200	1200	-	1	-	1	1	1	-	-	-	-	-
5	26	1	-	-	-	-	-	1	1	-	1	-	-	-	-	1
7	28	1	1700	1700	1700	-	-	1	1	1	1	-	-	-	35	
Totals		8				1	1	4	5	3	7	1	-	-	35	1

NOTE: No other Flowing Wells were reported for Stanley County.

Stanley County Well Notes

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

T.3N., R.25E. Sec. 12 — 21 feet:
"We depend upon the dam to water the stock. There are a few good wells in our township. They are about 35 ft. deep and it will water 150 head of stock all the year around."

T.3N., R.25E. Sec. 27 — 12 feet:
"Wells on this farm are dug in shale and do not provide much water. The flow is constant but slow. All stock is watered at dams in this territory. Wells are only used when dams go dry. A few wells in our neighborhood are good, others are poor. I believe the range program stimulating dam construction is most satisfactory."

T.3N., R.25E. Sec. 35 — 14 feet:
"We depend mostly upon dams for our water supply in this part of the state."

T.3N., R.26E. Sec. 3 — 16 feet:
"We have a subsoil of shale. We did a lot of testing and the surface well was all we could find. I have two dams on this place and my well is idle most of the time."

T.3N., R.26E. Sec. 29 — 10 feet:
"I have lived here 33 years and always had water, when it gets real dry, the water gets down to about 3 ft. I have a good water vein running through my property -a solid bottom of blue shale."

T.3N., R.30E. Sec. 22 — 1575 feet:
"Wells on this location seem to have considerable gas and flow very fast. The wells last about 5 years."

T.3N., R.30E. Sec. 29 — 6 feet:
"I have another well 8 1/2 ft. deep and curbed 7 ft.-100 gals. per day and has about 5 ft. of water. These wells are dug in a creek bed and they go donw to blue shale. I only use them in the winter time or any time my dam goes dry."

T.4N., R.25E. Sec. 16 — 18 feet:
"I have had two wells dug on my place but they would only flow 3 to 5 gals. a day and the water is strong with alkali. I have a good well on Sec. 16-4-25. It is located on a school section and has cottonwood creek running through it."

T.4N., R.25E. Sec. 12 — 12 feet:
"We depend on the dam for our stock. No dug wells in this locality. I have perhaps dug 50 shallow wells without success."

T.4N., R.25E. Sec. 24 — 28 feet:
"Wells have been difficult to construct because of quicksand over shale, and sometimes the shale is too hard to dig into very deep."

T.4N., R.25E. Sec. 29
14 feet:
"This well was dug and for some years after would supply 40 to 50 head of cattle but it failed about 8 years ago and now hardly furnishes enough for 10 head. Five years ago a deeper dug well was attempted but it also proved to be a failure. I use both wells to water 20 head of cattle at present. There have been numerous test holes dug but no water was found. Both of my wells are located in a small creek. In 1934 most all of the wells failed here and many of them never came back."

T.4N., R.25E. Sec. 32
16 feet:
"There are a few artesian wells in the county which furnish warm to hot water - most soft water. The dug wells are mostly hard and alkali, some are good for domestic use."

T.4N., R.27E.
Depth not given:
"All my water is taken from a dam, what water we get from wells is hard and no good for home use."

T.4N., R.26E. Sec. 14
20 feet:
"Very little surface water here - dams are the main source of water supply."

T.5N., R.26E. Sec. 29
12 feet:
"We have a dam which is depended upon for house and livestock use."

T.5N., R.28E. Sec. 8
1978 feet: (artesian)
"My neighbor and I sank a hole down 39 ft. and got 17 ft. of water in 4 inch hole but it was so strong with alkali, I let a weight down on a fish cord and it was so strong it turned the cord white. I think the well is cased to 1978 ft. All the water supply on this place is taken from a dam."

T.6N., R.29E. Sec. 20
1700 feet:
"There are no other wells in our township but three are 3 in 5 - 29, one flowing, the other pumped. Also one flowing in 7-28 - you no doubt have someone reporting them. People on the river bottoms have shallow wells but on the upland there are none. Dam water is used for practically all purposes in our township - except along the river."

T.7N., R.25E. Sec. 29
20 feet:
"This is not a well county but rather dams and is used by most every one for water supply. I have three large dams and three small ones and are well supplied with water. I believe more large dams should be constructed in the county- it would enhance the value of the county."

T.9N., R.25E. Sec. 31
6 feet:
"There is an old spring which has never been used only 1 yr. and two old shallow wells which are filled in. Wells of any depth go dry."

T.9N., R.25E. Sec. 27
14 feet:
"This well is not typical of the wells in the county, there being but a few of its kind. A big percent of the county is watered by dams because a drilled well must enter the artesian basin which is costly. There is not a sufficient number of large dams in the county."

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